CHAPTER 3
Description of the Preferred Alternative

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DESCRIPTION OF THE PREFERRED ALTERNATIVE

In accordance with the legislation, the Secretary for Resources must recommend a Preferred Alternative to the California Legislature. The Preferred Alternative was developed based upon recommendations by the Salton Sea Advisory Committee and public input on alternatives considered in the Draft Programmatic Environmental Impact Report (Draft PEIR). This chapter describes that process and the Preferred Alternative.

METHODOLOGY TO RECOMMEND THE PREFERRED ALTERNATIVE

The Draft PEIR included an evaluation of a range of alternatives that addressed the restoration objectives. The results were compared to Existing Conditions and projected conditions for the No Action Alternative in the Draft PEIR.

Fish and Game Code Section 2081.7 requires the Resources Agency to consult with the Salton Sea Advisory Committee throughout all stages of the alternative selection process, including development of the Preferred Alternative recommendation. During the review period of the Draft PEIR and following receipt of comments from the public review, the Salton Sea Advisory Committee and the associated Working Groups conducted several meetings to discuss the benefits and impacts of the range of alternatives and define criteria for the selection of the Preferred Alternative. This process and the results are described below in the section “Salton Sea Advisory Committee Recommendations.”

Summary of Alternatives Considered in Draft PEIR

The Draft PEIR considered the No Action Alternative and eight alternatives to meet the restoration objectives established for the Salton Sea Ecosystem Restoration program.

No Action Alternative

The No Action Alternative is intended to reflect Existing Conditions plus changes that are reasonably expected to occur through 2078 if none of the alternatives are implemented. Foreseeable future projects at the Salton Sea include implementation of mitigation measures for the Quantification Settlement Agreement (QSA) and Imperial Irrigation District (IID) Water Conservation and Transfer Project. The mitigation measures related to the Salton Sea include Air Quality Management actions for exposed playa, protection of desert pupfish (including extension and connection of agricultural drains that provide desert pupfish habitat), modification of recreational facilities, and delivery of mitigation water to the Salton Sea until 2017. These facilities would be determined under a process established to implement the mitigation measures for the IID Water Conservation and Transfer Project. However, the facilities could be modified with implementation of the Salton Sea Ecosystem Restoration Program. The costs of the facilities would be funded as part of the mitigation measures for the IID Water Conservation and Transfer Project. Participants in the Water Conservation and Transfer Project would fund up to $133 million of the mitigation measures, including measures not associated with the Salton Sea. Costs for mitigation measures in excess of the $133 million dollars would be funded by the State of California. The Draft PEIR takes a conservative approach to define the actions and facilities projected to be needed with a capital cost of $801 million with annual operations and maintenance costs of $49 million.

Future actions could change the projected conditions. For example, changes in the QSA may modify the required actions and facilities or related State obligations. However, such future actions, if any, would be too speculative under the California Environmental Quality Act (CEQA). Such changes, therefore, were not included in the No Action Alternative.

Range of Alternatives Considered in the Draft PEIR

The initial range of alternatives was broad and included options to convey water to the Salton Sea from different water bodies, convey salts from the Salton Sea to offsite disposal areas, and options to provide a range of habitats and water quality improvements within the Sea Bed. The broad range of alternatives was screened based upon the ability to meet legislative objectives for the restoration program, regulatory requirements, and technical feasibility for large-scale programs. Several options were eliminated from further analyses due to inability to meet regulatory requirements. The results of the broad screening efforts were further evaluated relative to the CEQA Guidelines for development of a reasonable range of alternatives. Based upon the screening analyses, alternatives that would convey water from the Colorado River, Gulf of California, and the Pacific Ocean were eliminated from further evaluation due to regulatory limitations; jurisdictional boundaries; and anticipated complexities associated with the acquisition, control, and access to the site for construction and operations and maintenance. The screening analysis resulted in the identification of eight alternatives.

The eight alternatives considered in the Draft PEIR were composed of several components in different arrangements. The components included Saline Habitat Complex (a series of 1,000-acre shallow ponds formed by earthen berms with salinities ranging from 20,000 to 200,000 mg/L to support a variety of fish and wildlife); Marine Sea in a portion of the Sea Bed (a large water body in a portion of the Sea Bed formed by rock barriers with marine salinity between 30,000 to 40,000 mg/L); Brine Sink (located at the lowest elevation in the Sea Bed to store excess salts, overflows from other areas, and flood flows); various conveyance facilities; water treatment for one alternative; and Air Quality Management (to reduce particulate emissions from playa that is currently under the Salton Sea the PEIR assumed the use of several methods, including salt-tolerant vegetation, brine crust, and other cover material).

The final alternatives in the Draft PEIR are listed in the following order to represent an increasing amount of complexity and number of components:

- Alternative 1 – Saline Habitat Complex I (38,000 acres of Saline Habitat Complex with minimum recirculation facilities and Air Quality Management);
- Alternative 2 – Saline Habitat Complex II (75,000 acres of Saline Habitat Complex with brine recirculation and Air Quality Management);
- Alternative 3 – Concentric Rings (61,000 acres of Marine Sea in two concentric rings, Air Quality Management , and no Saline Habitat Complex cells);
- Alternative 4 – Concentric Lakes (88,000 acres of habitat similar to Saline Habitat Complex in four concentric water bodies as defined by the Imperial Group, with dedicated inflows for Air Quality Management but no long-term facilities);
- Alternative 5 – North Sea (62,000 acres of Marine Sea in the northern Sea Bed, 45,500 acres of Saline Habitat Complex in the southern Sea Bed, and Air Quality Management);
- Alternative 6 – North Sea Combined (74,000 acres of Marine Sea in the northern, western, and southern Sea Bed; 29,000 acres of Saline Habitat Complex cells in the southern Sea Bed; and Air Quality Management);
- Alternative 7 – Combined North and South Lakes (104,000 acres of Marine Sea in the northern, western, and southern Sea Bed; 12,000 acres of Saline Habitat Complex cells in the eastern Sea Bed; water treatment of inflows and water withdrawn from the eastern portion of the northern Marine Sea; and use of Brine Stabilization for Air Quality Management at lower elevations); and

- Alternative 8 – South Sea Combined (83,000 acres of Marine Sea primarily in the southern Sea Bed with a smaller Marine Sea in the western and northern Sea Bed, 18,000 acres of Saline Habitat Complex in the southern Sea Bed, and Air Quality Management).

Results of the Impact Assessment

The alternatives were evaluated in accordance with CEQA. All of the alternatives, including the No Action Alternative, included construction activities within the Sea Bed. The primary differences between the alternatives are related to the ability to:

- Support a range of biological resources (primarily related to a range of habitats that could be provided by the habitat mosaics of the Saline Habitat Complex and the Marine Seas);
- Improve water quality (primarily related to salinity, selenium, dissolved oxygen, and hydrogen sulfide);
- Minimize air quality impacts (related to emissions from construction and operations and maintenance vehicles, and particulates from exposure of currently inundated playa); and
- Minimize impacts that could occur due to Sea Bed disturbances (air quality, unexploded ordinances, release of chemicals, and disturbances of cultural and paleontological resources).

Salton Sea Advisory Committee Recommendations

The Salton Sea Advisory Committee was involved in the screening and development of the alternatives and reviewed the results of the impact assessment presented in the Draft PEIR. During the preparation of the Draft PEIR, the Salton Sea Advisory Committee formed several working groups, including Habitat and Air Quality working groups, to evaluate specific issues. The Salton Sea Advisory Committee also established a Preferred Alternative Process Working Group to identify a process to compare the attributes of the Draft PEIR alternatives and define recommendations for the Preferred Alternative. The Preferred Alternative Process Working Group identified and prioritized critical attributes, identified attributes that would require further consideration during project-level analyses, and scored alternatives with respect to the prioritized attributes. These efforts were completed by the Preferred Alternative Process Working Group in conjunction with the Habitat and Air Quality working groups and a Water Quality Science Panel (Science Panel). The working groups consisted of members of the Salton Sea Advisory Committee members, or their representatives, as well as other interested individuals. The Science Panel included representatives of State and federal government agencies and several university professors who provided technical review of information considered in the Draft PEIR. Results of the evaluations considered by the Salton Sea Advisory Committee are described below.

Identification and Evaluation of Attributes Used for Comparison of Alternatives

The Preferred Alternative Process Working Group considered the statutory objectives for the Salton Sea Ecosystem Restoration Program. These objectives require the Preferred Alternative to provide the maximum feasible attainment of the following objectives:

- Restoration of long term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea;
- Elimination of air quality impacts from the restoration projects; and
- Protection of water quality.

The Salton Sea Advisory Committee determined that the Preferred Alternative must at least comply with these objectives. In addition, the Preferred Alternative Process Working Group considered other attributes

identified by the public during preparation of the Draft PEIR. The legislation did not mandate that the Preferred Alternative maximize opportunities for these other attributes. However, the Preferred Alternative Process Working Group determined that the alternatives could be compared relative to the following attributes:

- Ability to provide recreation and local economic opportunities;
- Compatibility with existing and planned land uses along the shoreline of the Sea Bed;
- Changes to microclimate along the shoreline of the Sea Bed;
- Adaptability of the alternatives to changes in climate, inflows, and habitat characteristics;
- Ability to reduce Environmental Justice (fair treatment and meaningful involvement of all people) and reduce the impact of hazardous conditions; and
- Potential for visual degradation, noise disturbance, and traffic congestion during construction and operations.

Following the identification of the overall attributes, the Salton Sea Advisory Committee requested that the Habitat and Air Quality working groups consider these and further develop attributes that could be used to evaluate the alternatives based on descriptions and impact assessment results presented in the Draft PEIR. No additional analyses would be completed during this process.

Habitat Working Group Recommendations

The Habitat Working Group considered the overall attributes and the results of the habitat related impact analyses presented in the Draft PEIR. Using this information, the Habitat Working Group defined a series of habitat based attributes and compared the ability of each alternative to meet the attribute objectives. The habitat based attributes included:

- Potential for restoration of historic bird and fish diversity and abundance in 2078;
- Potential for habitat management flexibility;
- Availability of habitat over the 75-year study period;
- Potential for effects of selenium on birds and fish;
- Potential for fish kills resulting from hydrogen sulfide generation within water bodies;
- Total volume of imported rock and gravel that could affect air quality, transportation congestion, and aesthetic characteristics;
- Potential for habitat disturbance due to potential recreational opportunities;
- Extent of habitat disturbance within the currently inundated Sea Bed during construction and operations;
- Extent of disturbance to riparian habitat adjacent to the Salton Sea and special status species that use the Salton Sea during construction;
- Potential for hazardous conditions associated with the Brine Sink after reaching a salinity of 200,000 mg/L; and
- Potential for habitat disturbance due to adjacent land uses.

The group also considered other attributes that were not included in the final analysis. Some of these attributes did not provide any differentiation between alternatives. For example, each alternative would be designed to protect and support special status species, including the desert pupfish. Therefore, the attribute "Ability to support desert pupfish" was not used as a stand alone attribute in the final analysis by the Habitat Working Group, but was included in the first attribute listed above. Some attributes were not considered because adequate information was not available in the programmatic analysis, such as "Potential for wildlife disease risk." Moving forward, additional evaluations could be conducted during project-level analyses for these types of attributes.

The Habitat Working Group used a method that combined grading and weighting to identify alternatives that provided the highest benefits for habitat. The alternatives considered to provide the highest benefits for habitat were Alternatives 1, 2, and 4 due to the presence of Saline Habitat Complex or similar habitat with a mosaic of shallow saline water bodies. Alternative 3 provided the highest level of connectivity for pupfish habitats located around the shoreline and a more shallow Marine Sea habitat than other alternatives. Alternative 5 was the highest rated alternative with a deep Marine Sea while also providing Saline Habitat Complex. However, the potential for hydrogen sulfide release in the deep Marine Sea may continue to result in fish kills as has occurred in the past at the Salton Sea. The scoring identified three distinct groupings of alternatives, which were Saline Habitat Complex (Alternatives 1, 2, and 4), shallow concentric water bodies (Alternatives 3 and 4), and deep Marine Sea with Saline Habitat Complex (Alternative 5).

The Habitat Working Group determined that the Saline Habitat Complex would provide extensive potential for historic bird diversity and abundance with the least uncertainty and risk, though fish diversity would be low. The Habitat Working Group also determined that an alternative with a Marine Sea could increase overall diversity of fish and bird species, though there is more risk due to water quality issues associated with hydrogen sulfide build up in the lower water depths. However, a deep Marine Sea with depths of less than 12 meters (39 feet) would minimize the long-term temperature stratification, in which warm surface water overlies cooler bottom water, that can lead to development and release of large amounts of hydrogen sulfide. Therefore, the Habitat Working Group determined that the best alternative might be a hybrid that combines the components from several alternatives and that habitat management flexibility would be crucial to manage for future uncertainty of biological and physical characteristics of the habitats.

Air Quality Working Group Recommendations

The Air Quality Working Group primarily compared the alternatives to the ability to comply with regulatory requirements. The air quality based attributes included:

- Ability to demonstrate conformity with applicable State Implementation Plans in accordance with the federal Clean Air Act; and
- Ability to meet particulate and nitrogen compound regulatory requirements (local significance thresholds) as developed by air quality management districts.

The Air Quality Working Group determined that most of the alternatives could not meet these requirements and would require further analyses to develop specific mitigation measures during project-level analyses. The Air Quality Working Group identified several mitigation measures such as extending the construction period to reduce annual emissions and particulates, development and use of low-emission equipment that currently is not available or under design, and identification of construction materials and methods that would reduce life-cycle air quality impacts. The Air Quality Working Group also identified the need for additional air quality monitoring around the Salton Sea; research on playa emissivity (ability of soil particles to become airborne); research on the ability of salt/brine crusts to limit playa emissivity

throughout the year, including periods with high humidity when brine crusts frequently break apart; and pilot testing of various dust control methods as the playa becomes exposed.

The Air Quality Working Group used a method that combined ranking and weighting to identify alternatives that provided the best ability to meet air quality regulatory requirements. The alternatives best meeting regulatory requirements were Alternatives 1, 2, 3, 4, and 5. These alternatives require the least amounts of imported rock and gravel, Sea Bed disturbance, and operations and maintenance activities; and therefore, would result in the least amounts of emissions.

Water Quality Science Panel Recommendations

The Salton Sea Advisory Committee also requested that the Science Panel review attributes related to water quality parameters. The Science Panel subsequently met to review attributes, determine their priority, and determine appropriate scoring for evaluating the attributes. The Science Panel considered four water quality parameters to be the most important for consideration in restoration of the Salton Sea ecosystem – selenium, hydrogen sulfide, water temperature, and dissolved oxygen.

The habitat risk from selenium (an essential element chemically related to sulfur) was considered by the Science Panel to be the most important water quality parameter affecting restoration efforts at the Salton Sea. The source of selenium in the Salton Sea is Colorado River water that has been used for irrigation on surrounding agricultural lands. In the shallow water habitats, selenium exposure routes for birds include exposure through the food web and mixing into the water column by winds. The concern for shallow water habitats is that selenium could increase over time, which would increase the potential for adverse effects to birds and may require periodic cleaning of habitat cells. The expected effects from selenium in birds would be some level of decreased hatchability of eggs in some breeding species of birds. Transitory species would not be affected because selenium is rapidly depleted in birds once they are removed from a selenium source. Effects were considered to be limited and could be mitigated. The Science Panel suggested actions to decrease potential adverse effects from selenium including avoidance of placing habitat in areas with high selenium concentrations in soils, increase habitat for those species most at risk for effects from selenium, and reduce selenium in water by diverting inflows with high selenium loads to the Brine Sink or geothermal re-injection.

Hydrogen sulfide was considered by the Science Panel to be a manageable issue, but was still weighted high in importance. Hydrogen sulfide is produced in the lower depths of the Salton Sea due to decomposition of organic matter that uses up oxygen in the water. Hydrogen sulfide produces adverse effects to fish, either directly or through effects on the food web. Therefore, both attributes were included in scoring of the alternatives. Deep sea configurations would be subject to prolonged temperature stratification which could result in periodic releases of hydrogen sulfide. The Science Panel advised that shallower sea configurations 10 to 12 meters (33 to 39 feet) deep would decrease the duration of stratification and lead to more frequent mixing of surface and bottom water, which would limit the development of hydrogen sulfide. Hydrogen sulfide levels could also be controlled to some degree with phosphorus reduction in the inflows to the Salton Sea, such as projected under proposed Total Maximum Daily Load (TMDL) limits developed in accordance with the Clean Water Act. However, existing sediments on the Sea Bed would continue to contribute phosphorus for some period of time. Due to limited data available, it was not possible for the Science Panel to determine the period of time that would be needed for phosphorus contributions from the sediments to be reduced, with subsequent reductions in hydrogen sulfide.

Water temperature was considered moderate in importance, but only for certain fish species, such as tilapia, in shallow water habitats. Deeper lakes would usually stay warm enough in winter to support tilapia due to the large mass of water that would retain heat. However, as observed at the Salton Sea in early 2007, even a large lake can occasionally experience fish kills during unusually cold weather. Temperature effects in shallow water habitats were considered important due to the limited diversity of

fish that would be present. If only tilapia are present, cold weather could decimate the population, and birds dependent on that population (such as pelicans in winter) would be adversely affected.

Issues for dissolved oxygen include diurnal (daily) fluctuations in shallow water habitats due primarily to photosynthesis and respiration of algae, and seasonal levels due to temperature stratification in deep water habitats. Dissolved oxygen was not a high priority for the Science Panel since control of other water quality parameters (primarily hydrogen sulfide and nutrients) would resolve the dissolved oxygen issue.

Greater concern for effects from selenium and hydrogen sulfide than for the other water quality parameters resulted in the Science Panel determining that alternatives comprised of shallow water habitat posed the least adverse water quality impacts. Mitigation strategies of maintaining depths of less than 12 meters (39 feet) and nutrient control for inflows were identified to significantly improve the water quality in the Marine Sea.

Overall Preferred Alternative Process Working Group Recommendations

The Preferred Alternative Process Working Group reviewed the recommendations of the other working groups and Science Panel and also considered other attributes not related to biological resources, air quality, and water quality. Overall, this working group determined that most of the potential impacts identified in the Draft PEIR could be reduced through mitigation measures developed during project-level analyses. However, it was recognized that many of the impacts may not be reduced to levels of less than significant in a CEQA analysis.

The Preferred Alternative Process Working Group also determined that due to the programmatic nature of the Draft PEIR, some details would need to be further defined and evaluated as a range of options during the project-level analyses. For example, recreation and local economic opportunities could be incorporated into any alternatives; however, the nature of the opportunities could be different. It was also determined that Early Start Habitat (2,000 acres of a pilot-type Saline Habitat Complex to be located near the southern shoreline) and Saline Habitat Complex-type of habitat should be included in the Preferred Alternative. However, the purpose of this working group was to define the process for determining a preferred alternative and provide some guidance to the Salton Sea Advisory Committee. Therefore, no specific recommendations for a Preferred Alternative were prepared by the Preferred Alternative Process Working Group.

Salton Sea Advisory Committee Recommendations on February 27, 2007

The results of the working group evaluations were considered by the Salton Sea Advisory Committee on February 27, 2007. Based upon this information and discussion that occurred at the meeting, the Advisory Committee recommended that the Preferred Alternative include:

- Saline Habitat Complex and Marine Sea habitat (as in Alternative 5);
- Early Start Habitat (as in all alternatives);
- Methods to protect air quality with conservative methods such as irrigated salt-tolerant vegetation (as in Alternatives 1, 2, 3, 5, 6, and 8); and
- Methods to protect water quality to improve habitat and reduce odors, including limiting the depth of the water bodies to less than 12 meters (39 feet) (as in Alternative 3).

The Advisory Committee compared these attributes to the alternatives and determined that Alternative 5 provided these attributes to a larger extent than other alternatives. However, Alternative 5 could not be recommended without incorporation of the following components that were evaluated as part of other PEIR alternatives:

- Expanded areas of the Marine Sea adjacent to existing communities as well as the State Recreation Area (as in Alternative 3); and
- Expanded Saline Habitat Complex areas (as in Alternative 2).

Salton Sea Advisory Committee Recommendations on March 27, 2007

On March 27, 2007, the Preferred Alternative proposal was presented to the Salton Sea Advisory Committee. This proposal included a Marine Sea formed by a barrier with water depths of less than 12 meters (39 feet). The Marine Sea shoreline was located at -230 feet msl, while the barrier was located at the -270-foot and -260-foot contours to provide water adjacent to existing communities and recreational areas. The Saline Habitat Complex was expanded along the southern Sea Bed from -230 feet to -266 feet msl contours.

Members of the Advisory Committee provided comments related to the need to provide a portion of the Saline Habitat Complex in the northern Sea Bed near the confluence of the Whitewater River, moving the Marine Sea Barrier to a deeper location to provide a larger Marine Sea, providing a Marine Sea area near the southern shoreline for increased recreational opportunities, and providing access for geothermal generation development. Some of the Advisory Committee members also discussed the use of water treatment for the inflows to improve water quality in a deeper Marine Sea.

Recommendations related to incorporation of the Saline Habitat Complex near the Whitewater River confluence, expanding the Marine Sea near the southern shoreline, and providing access for geothermal generation development were incorporated into the Preferred Alternative. However, moving the Marine Sea Barrier to a deeper location was not included in the Preferred Alternative due to a potential of water quality problems that could result in adverse impacts. All of the alternatives in the Draft PEIR and the Preferred Alternative assumed that water quality in the inflows would be improved through implementation of Total Maximum Daily Loads as would be implemented by the Colorado River Basin Regional Water Quality Control Board in the near future. However, water quality problems could continue to occur due to high concentrations of nutrients and selenium in the sediments. Water treatment to reduce these constituents in the Sea Bed sediments has not been demonstrated at the scale of the Salton Sea. As described above, maintaining water depths of less than 12 meters would improve mixing of the water column and reduce the potential for water quality problems in the Marine Sea. For these reasons, the recommendations of some Salton Sea Advisory Committee members to provide a Marine Sea deeper than 12 meters with or without water treatment was not included in the Preferred Alternative.

Consideration of Comments on the Draft PEIR

Nearly 34,000 comment letters on the Draft PEIR were submitted by agencies, Torres Martinez Tribe, interest groups, and individuals. Many of the letters were developed by interest groups and submitted by individuals. Most of the comments were related to biological resources, climate and air quality, recreation, and use of the Salton Sea as an agricultural repository and a recreation area. Many comments encouraged development of a Preferred Alternative that would be adaptable to changes in inflows, climate, land uses, and habitat needs.

With respect to biological resources, most of the comments requested the inclusion of a small Marine Sea in the northern Sea Bed, at least 25,000 to 50,000 acres of Saline Habitat Complex in the southern Sea Bed, Early Start Habitat, and methods to reduce water quality problems in all water bodies.

Most of the comments concerning air quality encouraged the use of a variety of methods to reduce air quality problems, implementation of research activities to develop methods that would reduce particulates from the playa, and use of water to protect agricultural microclimates and prevent salt dust on lands adjacent to the southern shoreline.

Many comments included reminders that Executive Orders over 80 years ago established the Salton Sea as an agricultural repository for drainage, and that the alternatives could not modify this use.

There were also many comments that identified the need to maintain water near shoreline communities and the State Recreation Area, to incorporate the proposed land use plans for the Torres Martinez Reservation, and to include recreational opportunities into the alternatives. There was discussion of establishing the shoreline water elevation at -228 feet msl to reduce the need for Air Quality Management methods by landowners of the exposed playa.

Most Cost-Effective, Technically Feasible Alternative

Fish and Game Code Section 2081.7 states that the evaluation of alternatives in the Salton Sea Ecosystem Restoration Study shall include "at least one most cost-effective, technically feasible, alternative." This section describes the most cost-effective, technically feasible alternative and the criteria for selecting this alternative. This information has been included in the ecosystem restoration study pursuant to Fish and Game Code Section 2081.7. For the purpose of this analysis, the term "most cost-effective" was defined as least cost because quantifying monetary benefits of restoration would be difficult at the current programmatic level of analysis. All of the alternatives are technically feasible.

The State determined, based on the evaluation of the eight alternatives, that two of the alternatives meet the most cost-effective, technically feasible alternative criteria, Alternative 2 (Saline Habitat Complex II) and Alternative 5 (North Sea). These alternatives were identified from among the other alternatives, all of which meet the program's legislative mandate of providing the maximum feasible attainment of the following objectives: (1) restoration of long-term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea; (2) elimination of air quality impacts from the restoration projects; and (3) protection of water quality."

As part of the process to determine the Preferred Alternative, the Salton Sea Advisory Committee's Habitat Working Group determined that the Saline Habitat Complex was the component that provided the most ecosystem benefits. The Saline Habitat Complex provided diversity of fish and wildlife similar to existing conditions. However, a Marine Sea could provide greater diversity of fish and wildlife similar to historical conditions. The Salton Sea Advisory Committee's Air Quality Working Group determined that meeting the legislation's air quality objectives was a high priority.

Based on this information, Alternative 2 was identified as the most cost-effective, technically feasible alternative because it include the largest amount of Saline Habitat Complex. The Saline Habitat Complex would provide similar diversity of fish and wildlife that currently exists at the Salton Sea. Alternative 2 would achieve this to a greater extent than Alternative 1. Additionally, Alternative 2 would be the most cost-effective alternative that best meets all of the legislative objectives. Although the construction and operations and maintenance costs of Alternative 4 as analyzed in the Draft PEIR would be less than those of Alternative 2, additional air quality measures would need to be added to Alternative 4 to fully meet the legislative objectives. This would increase the costs of Alternative 4, and therefore, Alternative 4 would likely be more costly than Alternative 2. Alternatives 3, 5, 6, 7, and 8 meet the legislative objectives to varying degrees, but are not as cost-effective.

Although Alternative 2 would provide diversity of fish and wildlife similar to those that currently exist at the Salton Sea, Alternative 2 may not fully meet the legislative objective "historic levels and diversity of fish and wildlife" because it does not contain a marine waterbody as has historically existed at the Salton Sea. The most cost-effective, technically feasible alternative that best meets this objective is Alternative 5. Alternative 5 includes a Marine Sea that would provide habitat for a diverse fishery that would support fish-eating birds. Alternative 5 is the most cost-effective of the alternatives that include a Marine Sea. Due to water quality impacts identified in the Draft PEIR (including the potential for hydrogen sulfide generation), the Marine Sea depth in Alternative 5 may need to be reduced to less than 13 meters.

While the most cost-effective, technically feasible alternatives were identified during development of the Preferred Alternative, the most cost-effective, technically feasible alternatives were not selected as the Preferred Alternative. The selection criteria for the Preferred Alternative not only included the legislative objectives, but also included additional criteria based on input from the Salton Sea Advisory Committee and public. These criteria included providing Saline Habitat Complex and Marine Sea habitat along the northern shoreline, a Marine Sea area near existing communities and recreational areas, a Marine Sea along the southern shoreline for recreation, and areas for geothermal generation development.

PREFERRED ALTERNATIVE

Information in the Draft PEIR and comments received from the public review of the alternatives described in the Draft PEIR were evaluated to develop a Preferred Alternative.

As described above, many of the recommendations described by the Salton Sea Advisory Committee members, other agencies, interest groups, stakeholders, and the public were incorporated into the Preferred Alternative. Several of the comments were not incorporated due to reasons as described above and in Chapters 4 through 9.

The Preferred Alternative is most similar to Alternative 5 with components described in the other alternatives. A description of the components, estimated costs, and implementation methods are described below.

Components of the Preferred Alternative

The Preferred Alternative, as shown in Figure 3-1, includes Saline Habitat Complex in the northern and southern Sea Bed, a Marine Sea that extends from San Felipe Creek to Bombay Beach (formed by barriers located at elevations from -260 to -270 feet msl), Air Quality Management facilities to reduce particulate emissions from the exposed playa, Brine Sink for discharge of salts, conveyance facilities, and Sedimentation/Distribution facilities. The Preferred Alternative also would include Early Start Habitat and an exclusion area for geothermal development. These components are summarized in Table 3-1 and described below.

Inflow Assumptions in the Preferred Alternative

The Preferred Alternative was based upon the same assumptions used for all alternatives in the Draft PEIR, including inflows. Inflows into the Salton Sea are influenced by multiple factors, including drainage flows from Imperial and Coachella valleys, flows from Mexico, and precipitation. Historically, inflows have exceeded 1.2 million acre-feet/year. A portion of these inflows are projected to be reduced after 2017 due to the IID Water Conservation and Transfer program. IID is providing additional inflows as a mitigation measure to maintain the salinity at less than 60,000 mg/L until 2017 which is when the salinity was projected to exceed this concentration without the transfer.

As described in the Draft PEIR, inflows may also decline because of water recycling in Mexico, changes in agricultural practices to meet projected Total Maximum Daily Loads, and changes to municipal wastewater disposal practices to meet discharge regulations. These types of changes have occurred in other areas of California. In addition, global climate change models are predicting an increase in evaporation rates which could further reduce inflows and increase evaporation from the Salton Sea, Saline Habitat Complex, or Brine Sink. Therefore, the Draft PEIR included risk-based analyses of inflows considering the various water sources. The results of the analyses identified the average annual inflow for the period 2018 through 2078 (the period after IID ceases to divert mitigation water) as 717,000 acre-feet. This value was used to compare the operations of the Draft PEIR alternatives and is used to define operations parameters for the Preferred Alternative.

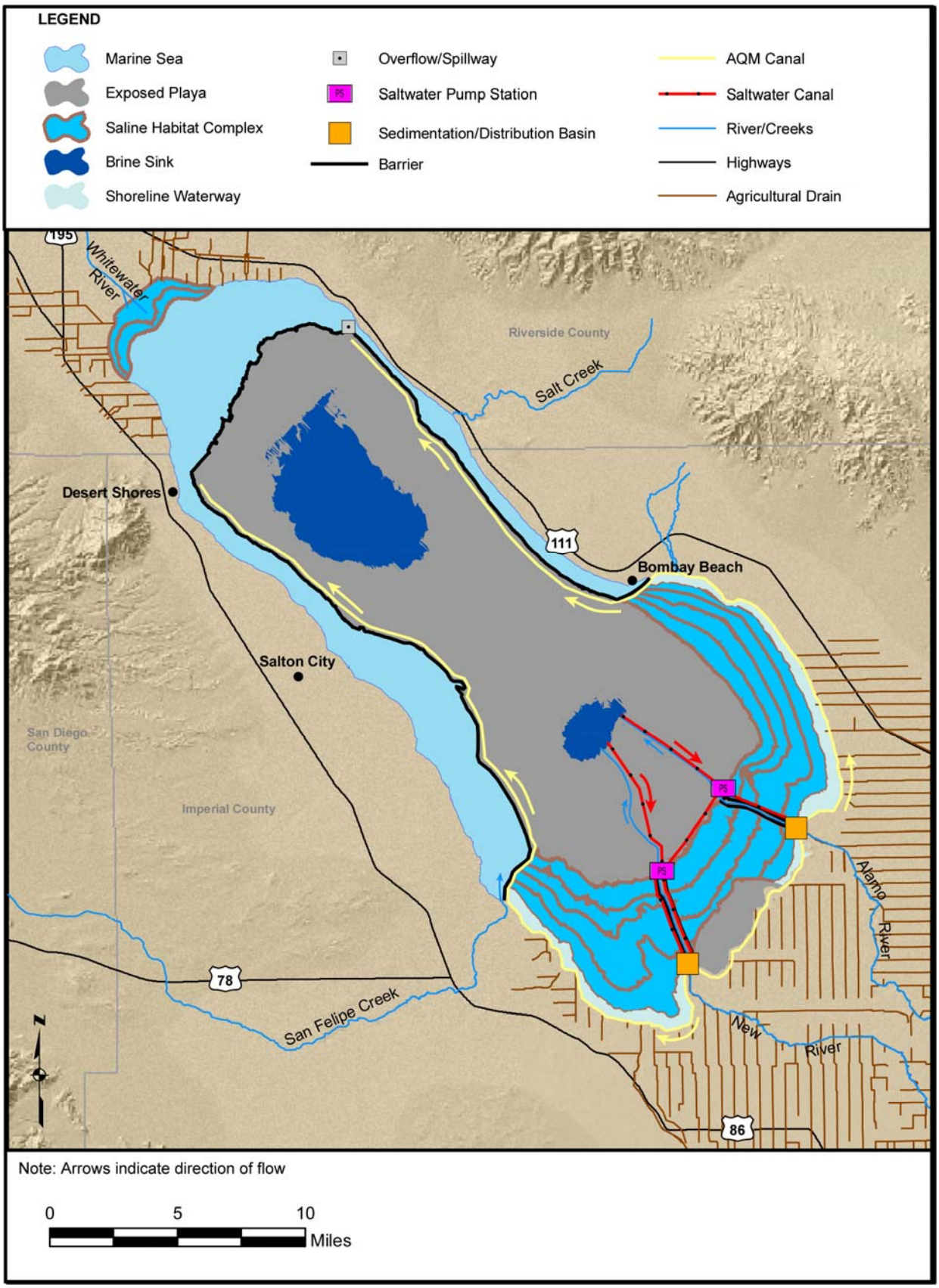

FIGURE 3-1
PREFERRED ALTERNATIVE

Table 3-1
Comparison of Infrastructure Features in the Preferred Alternative

	End of Phase I (2020)	End of Phase II (2030)	End of Phase III (2040)	End of Phase IV (2078)
Saline Habitat Complex (acres)	7,000	32,000	52,000	62,000
Saline Habitat Complex (wetted acres - including Shoreline Waterways)	7,000	39,000	46,000	46,000
Saline Habitat Complex Berms (miles)	20	117	158	158
Marine Sea (total acres)	Under construction	45,000	45,000	45,000
Marine Sea (salinity)	Not applicable	30,000 to 40,000	30,000 to 40,000	30,000 to 40,000
Marine Sea Barrier (miles)	Under construction	52	52	52
Two Sedimentation/Distribution Basins (acres)	400	400	400	400
Exposed Playa (acres - including Geothermal Area)	20,000	32,000	106,000	106,000
Air Quality Management area with water efficient vegetation (acres)	Monitoring and testing	17,000	54,000	54,000
Air Quality Management area with stabilization methods (acres)	Monitoring and testing	6,000	21,000	21,000
Air Quality Management Conveyance	36 miles of canals and 3 pumping plants	75 miles of canals and 5 pumping plants	75 miles of canals and 5 pumping plants	75 miles of canals and 5 pumping plants
Brine Sink Salinity (mg/L)	77,000	more than 200,000	more than 200,000	more than 200,000
Brine Sink Elevation (feet msl)	-240.6	-267.4	-275.6	-275.6
Brine Sink Area (acres)	200,000	109,000	17,000	17,000
Volume of imported rock and gravel (cubic yards)	182,861,000	187,703,000	190,234,000	190,234,000
Volume of Sea Bed soils excavated or dredged (cubic yards)	23,245,000	91,765,000	105,843,000	105,843,000
Trucks to import rock and gravel per day during peak construction period	3,000	100	50	0
Employees per day during operations and maintenance	20	150	300	300
Energy demand during operations and maintenance (Gigawatt-hour/year)	4	13	26	26

Water quality of the inflows is assumed to be improved as compared to Existing Conditions due to complete implementation of existing and proposed TMDL requirements established by the Colorado River Basin Regional Water Quality Control Board.

If the average annual flow value (717,000 acre-feet) was used for the "design flow," the Marine Sea would not receive adequate inflows in about half of the years in the 2018 through 2078 period. Therefore, the "design flow" criteria were based upon adequate inflows in at least 80 percent of the years in the 2018 through 2078 period. This average annual "design flow" is 650,000 acre-feet for the 2018 through 2078 period. When inflows exceed 650,000 acre-feet/year, flows not used in the Saline Habitat Complex, Air Quality Management of exposed playa with irrigated vegetation, and Marine Sea could be used to establish salt crust or additional temporary habitat on other portions of the exposed playa.

Location and Sizing of the Components

The location and sizing of several components were based upon specific criteria and in consideration of available inflows. For example, the location and size of the Marine Sea was based upon criteria to provide water along shorelines in existing communities and minimize water quality risk.

Saline Habitat Complex was located along the southern shoreline due to the proximity of the area with wildlife refuges, agricultural fields, and areas historically supporting large numbers of birds. However, the specific size of the Saline Habitat Complex was based upon the long-term availability of inflows.

The sizes of the Brine Sink and the exposed playa were based upon inflows and the balancing of water demands. The first and second priorities for use of inflows (based on two of the primary objectives of the Salton Sea Ecosystem Restoration Legislation), would be for habitat associated with the Saline Habitat Complex and Air Quality Management, respectively. The last priority would be for the Marine Sea. Therefore, if inflows decline to levels less than the "design flow," only the inflows to the Marine Sea would be reduced.

A design surface water elevation of -230 feet mean sea level (msl) was assumed for all components along the shoreline. This elevation was selected to allow construction of canals at the elevations of -228 and -230 feet msl to avoid the need to modify existing shoreline land uses and facilities. The elevation of the Marine Sea in the northern Sea Bed was located at -230 feet msl to reduce pumping requirements for the flows from the New and Alamo rivers. During project-level analyses, the actual elevations would be defined based upon final topographic and bathymetric survey results and detailed hydrologic analyses. It may be feasible to extend the Saline Habitat Complex along the northern shoreline to elevations -228 feet msl if the inflows for the first row of the northern Saline Habitat Complex only depended upon flows from the Whitewater River.

Saline Habitat Complex

The Saline Habitat Complex is intended to provide a diversity of habitats to support food web organisms (e.g., invertebrates and fish), that will provide an avian forage base similar to that which developed at the Salton Sea. Berms, islands, peninsulas, and snags would contribute to use by a variety of shorebirds and wading birds. Excavated areas up to 15 feet in depth would be incorporated to increase habitat diversity and provide shelter for fish and invertebrates.

Salinity within the Saline Habitat Complex could range from near 20,000 mg/L to 200,000 mg/L. Maintaining most of the Saline Habitat Complex with saline water (greater than 20,000 mg/L) would reduce vegetation growth, selenium ecorisk, and vector populations. The water supply would be from the New, Alamo, and Whitewater rivers plus water recycled from the Brine Sink or upgradient Saline Habitat Complex cells to achieve a minimum salinity of 20,000 mg/L.

The first rows of the southern Saline Habitat Complex that will extend from the shoreline (at -230 feet msl) to the first Berm (at -236 feet msl) would not be divided into ponds. This area would serve as a

mixing zone for the inflows and saline water and would be maintained at a salinity of 20,000 to 30,000 mg/L. Berms would be used in the remaining rows of the Saline Habitat Complex to provide multiple 1,000-acre cells.

Berms would be constructed of suitable earthfill materials excavated from the Sea Bed with 3:1 side slopes. A 20-foot wide gravel road on top of each Berm would allow access for maintenance. Rock slope protection would be placed on the water side of the Berm. Water depths would be less than 6 feet (2 meters). Berms could not be constructed until the Brine Sink (residual Salton Sea) recedes to an elevation below the Berm location.

The design of the individual cells within the Saline Habitat Complex would be flexible and could be modified to respond to environmental changes or the results of performance monitoring. The characteristics that would vary among cells likely would include salinity, overall water depth of the cell, presence or absence of islands and deep pools, number and arrangement of roosting and nesting structures, amount of shoreline, presence or absence of hard substrates, and bottom slope. The ratio of water to land, salinity, and arrangement of the cells would be developed in project-level analyses.

Immediately following construction, saline water from the Brine Sink would be conveyed through temporary pumping facilities into the first row of Saline Habitat Complex cells. The saline water would be mixed with the drain flows to provide salinity of at least 20,000 mg/L. After this initial mixing, salinity in each cell would be managed by controlling inflows and outflows, and evapo-concentrating the water in each cell to create cells with salinities ranging from 20,000 to 200,000 mg/L. During operations of the Saline Habitat Complex, water quality monitoring would need to be conducted to determine if constituents of concern accumulated to concentrations that would cause adverse impacts to fish and wildlife that used these areas.

Early Start Habitat

The Preferred Alternative would include up to 2,000 acres of shallow saline habitat for use by birds after the Salton Sea salinity becomes too high to sustain some species of fish. This habitat would be created prior to construction of full-scale habitat components, and is referred to as Early Start Habitat. Early Start Habitat was assumed to be located at elevations between -228 and -232 feet msl and could either be a permanent or temporary feature to be eliminated or assimilated as other components are constructed.

For the purposes of the Preferred Alternative, it was assumed that the Early Start Habitat area would be located along the southern shoreline because the flat slope of the Sea Bed would provide a large area for shallow water cells. The area is currently used by many birds. Most agricultural drains in this area are pumped into the Salton Sea and could provide a stable source of inflows into the Early Start Habitat. Saline water from the Salton Sea would be pumped into the cells to be mixed with freshwater from the drains to provide salinity between 20,000 and 60,000 mg/L.

The area would be divided into cells with Berms excavated from on-site materials. Average water depths within each cell would be less than four feet, although deep holes located away from the Berms may extend to 15-foot depths. Specific design and testing criteria would be developed in a project-level analysis.

Marine Sea

A Marine Sea would be formed through the construction of a Barrier. The Marine Sea would eventually stabilize at a surface water elevation of -230 feet msl with a salinity between 30,000 mg/L and 40,000 mg/L. Salinity in the Marine Sea would be managed through regulation of inflows and discharges. Air Quality Management Canals, Sedimentation/Distribution Basins, and Early Start Habitat would be constructed between the -228 and -230 foot msl contours and would avoid conflicts with existing land uses along the shoreline.

Inflows to the Marine Sea would include direct flows from the Whitewater River, Coachella Valley drains, Salt Creek, San Felipe Creek, and local drainages. Flows from the New and Alamo rivers would be blended in a large Air Quality Management Canal and diverted into the Saline Habitat Complex and the southeastern and southwestern portions of Marine Sea. The portion of the Air Quality Management Canal located between the Sedimentation/Distribution Basins and Marine Sea would be located along the shoreline of the Saline Habitat Complex and would be siphoned under major drainages and agricultural drains to ensure that existing drainages are not impacted and that connectivity is provided for desert pupfish between the drains and the Shoreline Waterway. Air Quality Management Canals would continue on the interior side of the Barrier where the Marine Sea is located. Flows from the Marine Sea would be spilled to the Brine Sink to maintain salinity and elevation control.

The water depth would be less than 12 meters (39 feet) to reduce the potential for hydrogen sulfide generation and potential fish kills, due to long-term temperature stratification. The Preferred Alternative assumes implementation of the proposed TMDLs for nutrients and selenium, and therefore, additional water treatment for inflows would not be required. However, there is insufficient information to determine the role that nutrients contained in sediments will have in continued production of hydrogen sulfide in the Marine Sea. Therefore, the Preferred Alternative is based upon a conservative approach that maintains water depth to less than 12 meters (39 feet). During project-level analyses, additional data should be collected and the maximum water depth should be re-evaluated prior to final design.

The Barrier would be constructed of rock with a seepage barrier on the upstream face. The Barrier would be up to 47 feet above the existing Sea Bed and up to a half-mile wide at the base. The final slope of the Barrier would be 10:1 on the Marine Sea side and 15:1 on the down gradient side. The structure would require compliance with DWR, Division of Safety of Dams regulations. For the purposes of the PEIR, it was assumed that the Barrier would be constructed using barges. Therefore, the Barrier would need to be constructed before the Brine Sink (residual Salton Sea) recedes. Rock used to form the Barrier could be delivered to the barges by a railroad trestle or at a harbor that could be used for Marine Sea access after construction. However, use of barges would result in extensive vehicle emissions, as described in the Draft PEIR. It may be more advantageous to construct a trestle that would be extended with construction of the barrier and could accommodate alternative fuel trucks to deliver rock to the barrier construction site. This could lead to lower air quality emissions and allow construction even if the Brine Sink water recedes. During project-level analyses, specific construction methods need to be evaluated to provide a cost-effective construction approach and to reduce construction impacts.

Sedimentation/Distribution Basins

Inflows from the New and Alamo rivers would be captured in two 200-acre Sedimentation/Distribution Basins to divert desilted river water into one of several Air Quality Management Canals or bypass flows into the Brine Sink through extension of the New and Alamo river channels. The unlined Sedimentation/Distribution Basins would be excavated along the shoreline and would be located from -228 to -230 feet msl. Water depths would be about 6 feet. Sediment collected in the basins would be periodically dredged and flushed into the Brine Sink through river extensions.

Air Quality Management

Prior to design of Air Quality Management facilities, monitoring and testing activities would be conducted to identify the potential for and rate of dust emissions, determine chemical characteristics of the playa, analyze response of salt crusts and sediments to humidity and wind. If potential for significant dust emissions occur, several actions could be implemented to reduce air quality problems. It is anticipated a combination of actions would be used because the playa characteristics may vary throughout the Sea Bed. For the purposes of the PEIR and the Preferred Alternative, the following assumptions were used to define Air Quality Management components:

- 30 percent of the total exposed playa would be non-emissive and require no actions;
- 20 percent of the exposed playa would use management options that do not require freshwater supplies, such as brine stabilization, sand fences, or chemical stabilizers; and
- 50 percent of the exposed playa would use water efficient vegetation that is irrigated with a portion of the inflows to the Salton Sea.

The conservative approach for control of dust emissions would use Air Quality Management Canals to convey water from the Sedimentation/Distribution Basins to a series of 2-square mile units on the exposed playa. Each 2-square mile unit would include water filtration and chemical treatment units to prevent clogging and scale in the irrigation system, pumps, and buried distribution and drip irrigation pipes. The drip irrigators would be buried to reduce potential for selenium toxicity to wildlife from ponded water. Facilities would be included in each unit to pump brine from the Brine Sink to the treatment unit to increase the salinity of the water to 10,000 mg/L, if needed. Drains would be constructed under the irrigated area and drainage water would be conveyed to the Brine Sink. Construction of the irrigation system would require excavations up to 8 feet deep for trenches throughout the exposed playa. Salt bush, or similar vegetation, would be planted every 5 feet apart in rows that would be separated by 10 feet.

Brine Sink

The Brine Sink would provide the repository necessary to store excess salts, water discharged from the Saline Habitat Complex, Marine Sea, and Air Quality Management areas, and excess inflows. Flood flows from the New and Alamo rivers would be flow directly into the Brine Sink through extensions of the river channels. High flows from San Felipe and Salt creeks and Whitewater River (via a submerged pipeline) would flow into the Marine Sea and overflow through a spillway into the Brine Sink. The elevation would fluctuate seasonally based upon the patterns of these tributary flows.

During project-level analyses, partitioning of the Brine Sink could be considered to provide another area with salinities of less than 200,000 mg/L that could support invertebrates and provide additional habitat on the Sea Bed.

Desert Pupfish Connectivity

Desert pupfish connectivity would be provided in four separate areas. The shoreline waterways (first rows of the southern Saline Habitat Complex) would provide connectivity for the Imperial Valley drains between Bombay Beach and to Alamo River and between New River and an area located to the south of San Felipe Creek.

The first row of the northern Saline Habitat Complex would provide connectivity for a portion of the drains in Riverside County. The Marine Sea would provide connectivity for the remaining drains in Riverside County and San Felipe and Salt creeks.

Area for Geothermal Development

Imperial County has one of the larger known geothermal resource areas in the world, including lands near the southern shoreline of the Salton Sea. Several geothermal generation facilities have been constructed on the upland side of the shoreline. Field investigations have indicated that additional generation facilities could be successfully constructed in currently inundated areas of the Sea Bed after the water recedes.

One of the areas that may include significant geothermal resources is located between the New and Alamo rivers along the southern shoreline. A portion of this area is located within the Sonny Bono Salton Sea National Wildlife Refuge, and most of the area is used extensively by many species of birds. Placement of Saline Habitat Complex and geothermal development in this area could require very specific

mitigation measures to avoid conflicts with geothermal facilities, including power transmission lines and other facilities.

Geothermal development will be extremely important in California and other southwestern states as part of a mosaic of energy sources to meet increasing energy demands. Therefore, the Preferred Alternative includes an area between the New and Alamo rivers without Saline Habitat Complex to reduce potential conflicts between geothermal development and habitat criteria. The geothermal development area would avoid the Sonny Bono Salton Sea National Wildlife Refuge lands and areas with pupfish connectivity in the drains. The Preferred Alternative includes Air Quality Management actions for the geothermal development area; however, specific Air Quality Management methods may be different for the industrial land uses.

Land Ownership Assumptions

The Preferred Alternative assumes that easements or deeds would be obtained for the entire Sea Bed below elevation -228 feet msl to allow construction and operations and maintenance activities. Costs of acquisition of easements and deeds are not included in the PEIR cost estimates.

If other land uses extend into the Sea Bed, the Preferred Alternative would need to be modified in project-level analyses. For example, if exposed lands are converted to cultivated agriculture to an elevation of -235 feet msl, either the components would need to be constructed at lower elevations or displacement dikes would be required to protect the agricultural land.

Implementing Entities Assumptions

The Preferred Alternative has been defined and evaluated as if one entity or group of entities implemented the program in a uniform manner. However, it would be possible for several entities to implement facilities under separate programs with some level of coordination. For example, facilities located in the northern and southern area of the Sea Bed could be implemented by separate entities with coordinated operations for conveyance of inflows. As another example, separate entities could implement components with different functions, such as conveyance, Air Quality Management, Marine Seas, and/or Saline Habitat Complex.

Construction Materials Assumptions

Design criteria for the Barrier would require extensive geotechnical investigations. Most of the existing geotechnical foundation information was collected near the mid-sea location and may not be applicable to final Barrier locations. Once geotechnical data are collected, the Barrier design concept would be refined. Changes in cross sections or materials could significantly change rockfill quantities, excavation quantities, and costs. Similarly, foundation treatment, if required, could change costs and construction methods.

For purposes of the PEIR, development of new rock sources or transportation facilities are not considered part of the Preferred Alternative. The Preferred Alternative assumption is that the Barrier design would use rock or boulders between 1 to 5 feet in diameter for the majority of the structure for stability. This rock size was not found to be available in large quantities at existing quarries during the preparation of this PEIR. However, the Preferred Alternative assumption is that this rock would be provided from a permitted quarry and transported to within 10 miles of the shoreline by methods other than trucks.

The Preferred Alternative includes gravel roads on top of all Barriers and Berms and approximately every mile in both north-south and east-west directions across the exposed playa. Therefore, an extensive amount of gravel would be required for the Preferred Alternative.

Implementation Schedule

Implementation of the Preferred Alternative would be accomplished in four periods:

- Period I: Five Year Plan/Pre-construction - 2008 to 2013;
- Period II: Major Construction - 2014 to 2025;
- Period III: Construction Completion - 2026 to 2035; and
- Period IV: Operations and Maintenance - 2036 to 2078.

Activities that would occur in each of these periods are summarized below.

Period I: Five Year Plan/Pre-construction - 2008 to 2014

It is anticipated that the California Legislature would select the Preferred Alternative, provide authorization for the next periods, and appropriate funds by late 2007. Following these actions, it is anticipated that the implementing entity(ies) would initiate a Five Year Plan including project-level analyses. Many issues could not be fully evaluated in the programmatic analysis due to lack of data or the need to select specific locations for facilities. Therefore, the Five Year Plan would focus on implementation of the Early Start Habitat, collection of additional biological and physical data, site-specific analyses of facilities, and design of facilities.

Demonstration Project and Early Start Habitat

The U.S. Department of the Interior, Geological Survey (USGS), is currently conducting a Salton Sea Shallow Water Habitat Pilot Project. This project includes several shallow ponds containing small islands within an approximately 100 acre area. The ponds do not incorporate deep holes or snags.

DFG is currently developing a Demonstration Project near the southeastern shoreline of the Salton Sea. This demonstration project would include ponds with deep holes, islands, and snags. Information from the Demonstration Project could be used to develop the final design criteria for the Saline Habitat Complex. Prior to construction of the Demonstration Project, environmental documentation and design documents would be prepared and permits would be acquired.

There is concern that water quality in the Salton Sea will degrade prior to and during construction of the Preferred Alternative and that fish and birds that forage on fish could be lost. Therefore, an Early Start Habitat of up to 2,000 acres of Saline Habitat Complex emphasizing cell configurations that will support fish would be constructed. This would provide both habitat during construction and allow further full-scale pilot evaluation of this habitat prior to final design.

Prior to construction of the Early Start Habitat, an evaluation of potential sites would be conducted. If necessary, several sites may be identified for site-specific field investigations. Geotechnical analyses, topographic and bathymetric surveys, and sediment and water quality analyses would also be completed. Removal of sediment with high concentrations of contaminants may be considered to protect water quality and habitat values. These evaluations could require 12 to 18 months to define seasonal variations.

Following these analyses, preliminary design would be initiated for the Berms and conveyance facilities to divert inflows into the Early Start Habitat ponds, manage salinity in the ponds, and divert water from the ponds without adverse impacts to fish in the Early Start Habitat ponds or desert pupfish. Concurrently, an environmental document would be prepared. This process could require about 6 months.

Final design would be completed and permits would be obtained from federal, state, and local agencies. The final design could include several types of Berms, such as the use of Geotube® Berms or other facilities which could change construction schedule assumptions. The final design and permitting processes could require up to 12 months. After permits are approved, construction could occur in less

than 6 months. Based upon this estimated timeline, the Early Start Habitat would be fully implemented by 2011.

Biological Investigations in the First Five Years

In addition to the field investigations and monitoring associated with the Early Start Habitat, existing biological monitoring in the Salton Sea would be expanded. Additional monitoring of breeding and roosting sites, invertebrates, and fish and bird populations may be conducted. Pilot studies would be conducted to investigate temperature and salinity tolerances for various fish species and methods to reduce impacts on fish and birds during construction of the Preferred Alternative.

Inflows, Water Quality, and Sediment Quality Investigations in the First Five Years

The PEIR analysis was based upon available inflow data collected through 2004. However, inflows have changed significantly since 2004 and will continue to change. For example, up to 200,000 acre-feet of flows in the New River from Mexico may be eliminated. Changes in farming practices due to new regulatory requirements may either reduce flows or change flow patterns into the Salton Sea. Therefore, additional data should be evaluated using hydrologic and hydraulic models to improve the reliability of inflow projections.

An extensive sediment and water quality monitoring program for nutrients, selenium, ammonia, hydrogen sulfide, and hazardous constituents would be conducted to define characteristics and seasonal and annual variations at locations of the Saline Habitat Complex, Marine Sea, and exposed playa. Water quality analyses in the Salton Sea also should include evaluation of the potential for release of hydrogen sulfide and ammonia based upon water and sediment chemistry. These data would be used to further develop analytical models to project characteristics during construction and operations and maintenance. These efforts would be coordinated with other monitoring programs established by regulatory agencies. Based upon these data and associated modeling, locations of habitat facilities may be modified from those identified for the Preferred Alternative.

Air Quality Investigations in the First Five Years

The air quality actions would be integrated with the efforts by other agencies in the Imperial and Coachella valleys. Additional air quality monitoring stations (up to 20 stations) would be installed to improve the understanding of wind patterns and background constituent concentrations along the entire Salton Sea shoreline and surrounding valley area. Monitoring stations also could be established close to the ground to define the effect of the Salton Sea on the microclimate on adjacent lands.

As the Salton Sea recedes, the exposed playa would be tested for chemical constituents and emissivity. It is feasible that exposed playa characteristics would vary with geography and elevation. Investigations would be conducted to determine the amount of salt and dust accumulated on nearby crops and the potential impacts on the crops.

Geotechnical Investigations and Surveys in the First Five Years

Geotechnical investigations and topographic and bathymetric surveys would be conducted over the entire Sea Bed with specific focus at the identified locations of Barriers, Berms, canals, and Air Quality Management facilities. Based upon the results of these investigations, structural design criteria and construction material requirements would be defined, including needs for excavated soils in the Sea Bed and imported rock and gravel. As part of this effort, detailed analyses of rock and gravel quarries would be conducted to identify sources of rock of appropriate sizes and chemical composition to withstand high salinity conditions. Pilot studies for Barrier and Berm designs could be completed in portions of the Salton Sea or in the Early Start Habitat area. If adequate construction materials are not available, the final designs would need to be modified.

Several previous studies, as described in the PEIR, identified the potential for unexploded ordinances and hazardous materials in the Sea Bed. Site-specific investigations would be completed.

Construction Methods and Materials Investigations Within the First Five Years

The PEIR analysis is based upon conventional construction methods and construction materials. However, due to concerns about global warming, new equipment and technologies are being developed. Therefore, an evaluation of available and potentially innovative construction techniques that minimize vehicle and industrial emissions and greenhouse gases would be conducted. Alternative construction methods for the Barrier could range from considerations of extended railroad sidings, harbors, or use of trestles to provide flexibility during construction and potentially reduce emissions from the use of barges. In addition, pilot studies would be performed to identify materials and methods that could withstand the high salinity conditions and minimize operations and maintenance activities. Many of these pilot studies would be conducted as part of the Early Start Habitat efforts described above.

Coordination with Torres Martinez Tribe

The Torres Martinez Reservation is located along the northern shoreline and extends into the Salton Sea. The Torres Martinez Tribe is currently preparing a new General Plan and associated documents. During this period, significant coordination efforts would be conducted to integrate the new plans with the Preferred Alternative. Site access agreements also would be negotiated to allow construction and operations and maintenance of the Preferred Alternative on tribal lands.

Access and Utility Agreements

Access agreements, either land deeds or easements, would be required for currently inundated land under the Salton Sea between the -228 foot and -230 foot msl contours for access facilities, Sedimentation/Distribution Basins, and corridors for roads and electrical distribution facilities. Specific locations for geothermal generation facility exclusion areas would be evaluated. Utility agreements would be negotiated with IID for electrical service, communications services, and potable water service for operations and maintenance buildings.

Project-Level Environmental Documentation and Final Design

Information collected during the investigations described above would be compiled into a preliminary design report that would consider a range of locations, sizes, and construction methods for facilities in the Preferred Alternative. Environmental documentation would be completed concurrently with preparation of the preliminary design report. The environmental documentation would further evaluate benefits and impacts of specific facilities during construction and operations and maintenance, as well as identify mitigation measures to reduce the effects of impacts. The Draft PEIR included “Next Steps” that should be considered during project-level analyses to reduce risks and potential adverse impacts. The Next Steps are summarized in Table 3-2.

Following the adoption of the environmental documentation, final design would be completed and plans and specifications would be prepared for bidding.

Bidding Period

It is anticipated that due to the unique nature of the design, construction methods, and site conditions, the bidding period and bid-checking period could require up to 12 months prior to initiation of construction. It is anticipated that multiple bid packages would be prepared. Therefore, portions of the construction could occur prior to other portions.

Table 3-2
Next Steps to be Considered during Project-Level Analyses

Resources	Items that should be considered during project-level analyses
Surface Water Resources	Best Management Practices to reduce erosion and polluted runoff during construction and operations and maintenance in accordance with the Stormwater National Pollutant Discharge Elimination System permit.
	Inflow investigations of volumes and flow patterns to determine specific locations of facilities and measures to protect against flood events or increases in future inflows.
	Seiche analyses to define surface water elevation of the Brine Sink and Marine Sea that would avoid inundation of lands above the design surface water elevation.
Surface Water Quality	Water, sludge, and sediment analyses of constituents that could adversely affect benefits of the Brine Sink. If adverse impacts occur, the materials should be hauled to a certified disposal site.
	Water quality and sediment assessments to determine specific locations for facilities and understand nutrient and chlorophyll *a* dynamics, external/internal source contributions, timing and extent of the Salton Sea response to load reductions, effectiveness of water quality improvements in the watershed, effectiveness of Sedimentation /Distribution Basins to remove constituents, and real-time temperatures. Sediment quality monitoring to understand sediment resuspension, sediment release, nutrient sequestration, and sediment oxygen demand.
	Pilot studies of shallow water cells on recently exposed Sea Bed to determine the rate of nutrient fluxes to the water column and other biological parameters that may be different on the Sea Bed materials as compared to pilot studies being conducted on lands adjacent to the Sea Bed.
	Multi-dimensional hydrodynamic and water quality model, with coupled sediment pool, for the Salton Sea that could be used, in tandem with monitoring efforts, to provide more detailed analysis of specific facility locations and methods to reduce internal nutrient loads.
	Habitat design criteria to maximize full mixing in the water column, such as orientation of islands parallel to the prevailing winds or orientation of the open water to take advantage of wind fields; and determine depth of Saline Habitat Complex pools to balance temperatures and water quality.
	Construction methods to limit the potential to re-suspend bottom sediments.
Groundwater Resources	Groundwater changes under the Coachella Valley Water District Water Management Plan evaluated to determine if surface water elevations adjacent to the Indio Subbasin of the Coachella Valley Basin should be designed to reduce further saltwater intrusion.
	Best Management Practices to protect groundwater during construction and operations and maintenance activities in accordance with a Stormwater Pollution Prevention Plan.
Biological Resources	Biological field investigations to determine specific locations of fish and wildlife resources; and develop specific biological impact avoidance criteria, including construction techniques, schedules, and facility locations. Potential mitigation measures could include methods to avoid disturbance of: breeding or roosting special status birds by scheduling the construction or maintenance activities near those habitats outside the breeding season and times of large roosting aggregations, or creation of similar habitats; desert pupfish during construction by conducting pre-construction surveys, capture and relocation of desert pupfish in the work area, scheduling work to avoid breeding season, and isolating the work area so that desert pupfish cannot enter; or consider a genetic exchange plan.
	Adaptive management program and monitoring program.
	Pilot projects to understand colonization of Saline Habitat Complex by invertebrates, fish, and birds; efficacy of the installation of snags, islands and other resting/loafing areas in managed habitats; need and methods for incorporating areas of freshwater within Saline Habitat Complex to accommodate the requirements of breeding birds and their young; and ratio of wet to dry areas.
	Maintenance plan for the Sedimentation/Distribution Basins that minimizes dredging in wetlands.
	Desert pupfish connectivity methods to link San Felipe and Salt creeks and the agricultural drains, including piping river channels to the Brine Sink.

Table 3-2
Next Steps to be Considered during Project-Level Analyses

Resources	Items that should be considered during project-level analyses
	Methods for gravity and pumped diversions to avoid or minimize impacts to desert pupfish;
	Characterize the distribution of selenium in the sediments and co-located biota, and water to refine predictions of selenium risk and develop criteria to minimize selenium uptake in the food web.
	Recreational criteria to protect special status resources.
Geology, Soils, Faults, Seismicity, and Mineral Resources	Geotechnical investigations to determine specific geologic and soil characteristics; and develop design criteria consistent with the California Building Code to minimize the risk of damage and prevent injury or death during construction and operations and maintenance. Facilities or excavation activities located to avoid unstable soils, volcanic activity, or mineral resources.
	Range of materials and facility locations to minimize the need for mineral resources. For example, use of synthetic sheet piling may reduce the need for rock in shallower sections of the Barrier, although this could increase the need for petroleum products.
Climate and Air Quality Resources	Best available control measures and most stringent measures as required by the Imperial County Air Pollution Control District and South Coast Air Quality Management District .
	Methods other than haul trucks to deliver materials, such as trains or conveyors, watering soils during construction, pave or apply chemical stabilizers to roads on construction sites.
	Fugitive dust investigations for construction activities to estimate emissions, exposure assessment, and potential impacts on adjacent agricultural and community land uses.
	Emissions investigations for Exposed Playa areas to determine the amount and composition of the fugitive dust emitted from playa and the conditions that result in stable versus emissive conditions.
	Compliance with general conformity with the applicable State Implementation Plans through mitigation or other accepted practices.
	Odorous emissions investigations linked to the surface water and sediment quality investigations reduce odorous air emissions associated with off-gasing and fish die-offs.
	Microclimatic conditions investigations to determine effects of the facilities on agricultural lands adjacent to the Salton Sea.
Land Use	Facility locations and construction methods to reduce the impacts to existing land uses, including the conversion of agricultural lands, including Farmlands of Statewide Importance.
	Facility locations to minimize exposure of currently inundated Torres Martinez Tribal lands.
Population and Housing	Coordination with local construction organizations to maximize opportunities for local workers and minimize potential housing impacts due to out-of-area construction workers.
Recreation	Coordination with local communities to incorporate appropriate recreational opportunities.
Hazards, Hazardous Waste, and Public Health	Hazards investigations to locate undocumented, residual hazardous wastes.
	Best Management Practices guidelines for on-site storage and use of fuels and other potentially harmful materials and training of construction personnel.
	Public access prohibited on the construction sites if hazards exist.
	Staging and construction areas with hazardous materials located away from public areas.
	Coordinate with U.S. Navy that recommended additional investigations at the Salton Sea Naval Test Base to survey and remove or detonate in place any detected ordnance if land use changes occurred, such as construction of major facilities or development. Additional investigations should be conducted throughout the Sea Bed that could be disturbed during construction.
	Sediment investigations and monitoring programs to reduce the risk of exposure to constituents that could be released during soil disturbance. Worker training programs and breathing apparatus would be provided for all workers during construction.
	Sediment investigations to determine risks to workers and public due to unstable soils and geothermal conditions.
	Monitoring programs could be considered in coordination with public outreach programs to minimize potential risks associated with consumption of fish and wildlife tissue with high selenium.

Table 3-2
Next Steps to be Considered during Project-Level Analyses

Resources	Items that should be considered during project-level analyses
	Coordinate with Coachella Valley Mosquito and Vector Control District BioControl Facility (Indio, California) to identify and reduce hazards due to mosquitos and vectors.
Cultural Resources	Investigations in accordance with Section 106 of the National Historic Preservation Act and implementing regulations under 36 CFR 800, as amended, including a pedestrian cultural resources survey of exposed lands as the Salton Sea recedes by a qualified archaeologist.
	Testing and Evaluation Plan to evaluate identified archaeological sites, and if feasible, avoid disturbance, or develop a Data Recovery Plan.
	Construction Monitoring and Treatment Plan to ensure that new sub-surface discoveries are adequately recorded, evaluated, and, if significant, mitigated. If human remains encountered, consultation with the most likely Native American descendant, the Office of Historic Preservation, and the counties of Imperial or Riverside coroners. Discovered sites should be properly recorded with the appropriate California Historic Resource Information System office.
	Construction specifications, to the extent feasible, should require all Sea Bed disturbances to be monitored by a qualified archaeologist and a Native American representative.
	Construction worker training to recognize and report any discoveries of cultural resources and prohibited activities, such as the unauthorized collection of artifacts.
Paleontological Resources	Paleontological Resources Monitoring and Recovery Plan for all disturbances, including methods to: confirm the paleontological sensitivity (high, moderate, or low) of the areas to be impacted through review of project-level geological and geotechnical data; determine the qualifications of the paleontologist; assess and recover discovered fossil resources; and establish a monitoring program during and after construction.
Noise Resources	Noise investigation to identify Existing Conditions and potential changes due to construction and operations and maintenance activities at sensitive receptors due to noise and vibrations.
	Construction methods and materials to reduce noise and vibration impacts, including use of hydraulically or electrically powered impact tools or exhaust mufflers; manufacturer's standard noise control devices; locate stationary equipment and components as far as possible from noise sensitive receptors; minimize idling of construction equipment; use acoustic barriers, phase construction times; and notify nearby property users during construction periods.
Aesthetic Resources	Design criteria to minimize visual impacts, including methods to camouflage large facilities with vegetation or use of textures and color to blend into the environment.
	Non-glare lighting with on-demand switching, where possible.
Public Services and Utilities	Traffic plans and emergency response plans for construction to reduce the risks, such as worker training programs, required private security and fire protection at construction sites, or fee schedules for construction permits to include funds for emergency services.
	Solid waste facilities fee schedules to promote recycling and minimize solid wastes. It may be necessary to mandate hauling of solid wastes to landfill sites located outside of the study area. Hazardous waste site would need to be hauled to certified landfills.
	Solar generation plans for facilities to minimize electrical generation requirements and need for construction of electrical transmission and distribution lines in habitat areas.
Traffic and Transportation Resources	Traffic study to minimize construction impacts on roadways, including: extend railroad sidings and/or conveyors to the shoreline or trestles to construction sites; carpooling for workers; stagger start-stop times of shifts and haul times; use flagpersons; maintain emergency access at all times; and establish appropriate parking areas at construction and facility sites.
Power Production and Energy Resources	Energy savings measures and alternative energy sources, such as electric equipment and vehicles, and solar power.
	Transmission and distribution lines and related facilities that cannot be replaced by solar power should be located to avoid/reduce significant environmental impacts.
	Coordinate with geothermal industry to establish locations of power generation and transmission facilities in coordination with the habitat and air quality management facilities.

Period II: Major Construction - 2014 to 2025

Construction phasing of the Preferred Alternative would be determined by water elevations in the Salton Sea. Under concepts evaluated in the PEIR, construction of the Berms for Saline Habitat Complex could not occur until the water recedes in the area where the Berm would be constructed. Construction of the Barrier may be more appropriately completed while the water in the Brine sink (residual Salton Sea) is deep enough to support barges.

Initial construction activities would most likely include Sedimentation/Distribution Basins, Air Quality Management Canals along the shoreline, harbors or other construction staging areas, trestles or other delivery systems for constructing the Barriers. The Air Quality Management Canals also would convey water to the Marine Sea from the New and Alamo rivers. The construction period for the Barrier would be limited by design criteria, availability of construction materials each year, and the ability to transport construction materials to the Salton Sea without causing major traffic impacts in the area.

The construction period for the Barrier in the Preferred Alternative is projected to extend from 2014 until early 2022. Based upon the inflow projections, the Marine Sea salinity would be over 80,000 mg/L and the surface water elevation would be -248 feet msl at the time the Barrier would be closed. Marine Sea salinity would be less than 40,000 mg/L and the surface water elevation would be at -230 feet msl within 15 months of the completion of the Barrier.

As the water recedes, Saline Habitat Complex Berms would be constructed. Based upon the Preferred Alternative layout and the associated inflow projections, Berms located at -236 feet msl could be constructed after 2018 after the surface water elevation recedes to -238 feet msl. This area would be the Shoreline Waterway and would be used to distribute water to other portions of the Saline Habitat Complex and provide connectivity for the desert pupfish. The next Berms would be located at -242 and -248 feet msl and could be constructed in 2022 and 2024, respectively. Salinity goals in the Saline Habitat Complex could be achieved within months following completion of the Berms.

If the geothermal facilities are not constructed in this period, the exposed playa in the geothermal area would be monitored and pilot studies would be conducted to determine the most cost-effective method to control particulate emissions. Air Quality Management facilities would be constructed in this Major Construction Period, if needed.

Operations and maintenance activities would begin towards the end of this period and include periodic inspections for facility conditions and safety; repairing or replenishing Berms for seepage, erosion, and settlement; repairing roads with rock addition; repairing water conveyance facilities in the Saline Habitat Complex, and Air Quality Management Canals and facilities; dredging of Saline Habitat Complex holes to maintain depths; vegetation and vector control; and repairing and replacing of conveyance pumps.

Period III: Construction Completion - 2026 to 2035

After 2025, inflows are projected to recede rapidly due to changes in irrigation practices and elimination of inflows from Mexico. Saline Habitat Complex Berms would continue to be constructed. The Berms at -254, -260, and -266 feet msl would be constructed in 2026, 2028, and 2033, respectively, as shown in Table 1. The exposed playa would be monitored and pilot studies would be conducted to determine the most cost-effective method to control particulate emissions. Air Quality Management Canals on the Sea Bed would be constructed as the water recedes below -260 feet msl. It is anticipated that the playa would be fully exposed by 2035. However, construction may continue after 2035 as results from the emission monitoring programs and pilot studies are completed. The PEIR assumes that the Air Quality Management facilities are completely constructed by 2035.

Operations and maintenance activities would continue as described for the Major Construction Period. In addition, operations and maintenance activities would begin for the Air Quality Management and Marine Sea facilities. These activities would include periodic inspections for facility conditions and safety; repairing or replenishing Barriers as well as Berms for seepage, erosion, and settlement; continued repairing of roads with rock addition; repairing water conveyance facilities in the Saline Habitat Complex, Air Quality Management Canals and facilities, and Marine Sea outlets; continued dredging of Saline Habitat Complex holes; continued vegetation and vector control; repairing and replacing of conveyance pumps and Air Quality Management pumps, filters, and treatment facilities; and replacement of chemicals used in Air Quality Management facilities. It is anticipated that the Air Quality Management drip irrigation system will require daily maintenance to reduce fouling and plugging. Security patrols also would occur on a daily basis.

Period IV: Operations and Maintenance - 2036 to 2078

Operations and maintenance activities would continue as described above throughout this period and beyond. It is anticipated that the inflow conditions assumed for the Preferred Alternative would continue after 2078. Although the IID Water Conservation and Transfer Program is only authorized until 2078 (assuming renewal in 2048), most of the inflow reductions projected for the Salton Sea are not related to the water transfer and would not change by 2078. If the water transfer is not renewed in 2078, the additional inflows may be used to expand the Saline Habitat Complex following additional evaluations or convert a portion of the Brine Sink to useable habitat.

Estimated Construction Cost

Based upon assumptions described in the Draft PEIR, cost estimates for construction and operations and maintenance at build-out were developed for the Preferred Alternative, as shown in Table 3-3.

Table 3-3
Estimated Capital and Operations and Maintenance Costs For Preferred Alternative
(In Million Dollars, 2006 Dollars)

Items	Capital Cost	Annual Operations and Maintenance Cost at Build-out
Barriers	$3,991	$27
Saline Habitat Complex (including Early Start Habitat)	$758	$10
Water Conveyance	$168	$6
Air Quality Management	$891	$99
Subtotal	$5,808	$142
Additional Miscellaneous Items at 5% of Subtotal Above	$290	—
Total Construction Cost	$6,098	—
Contingencies at 30% of Total Construction Cost	$1,830	—
Subtotal	$7,928	—
Engineering, Administration, and Legal at 12% of Subtotal Above	$951	—
Total Capital Costs	**$8,879**	**$142**

Note: Costs do not include cost of Demonstration Project ($6.6 million), investigations in addition to pre-design efforts and administration prior to construction ($19.3 million), permits, land or easement acquisition (estimated at $10 million for Early Start Habitat), and interest on borrowing funds.

The estimated cash flow estimate is presented in Table 3-4 based upon the assumptions described above.

Table 3-4
Estimated Cash Flow for the Preferred Alternative
(In Million Dollars, 2006 Dollars)

	2008- 2013	2014- 2020	2020- 2030	2030- 2040	2040- 2078
Costs for pre-design, design, environmental documentation, permitting, and bidding for construction through 2025	$395.8				
Costs for other investigations, Demonstration Project, Early Start Habitat, $10 million for Early Start Habitat easement/land, and administration until construction	$113.1				
Construction; construction management; administration during construction; and pre-design, design, environmental documentation, permitting, and bidding for construction from 2025 through 2035	0	$5,930.3	$1,324.0	$1,153.1	0
Total Capital Costs	**$508.90**	**$5,930.3**	**$1,324.0**	**$1,153.1**	**0**
Annual Operation and Maintenance Cost	$0.7	$0.7	$70.9	$141.9	$141.9

Note: Costs do not include permits, land or easement acquisition (except Early Start Habitat), or interest on borrowing funds.